solvers

After initializing the surface and coils, the core part is calling minization algorithms to optimize coil parameters.

[called by: focus.] [calls: bnormal, bmnharm, torflux, length, coilsep, descent, congrad, hybridnt, truncnt.]

Cost functions

The chi-squared optimization method is used here. The single target function is composed of several chosen object functions with user-supplied weights. The general formula is

$$\chi^2(\mathbf{X}) = \sum_j w_j \left(\frac{f_j(\mathbf{X}) - f_{j,o}}{f_{j,o}} \right)^2 . \tag{1}$$

Currently, we have implemented constraints on Bnormal, Bmn harmonics, toroidal fulx, coil length, coil-coil separation. For details, please view the docuentation of each constraint.

Normalization

Besides the normalization terms in each constraint, like $|\mathbf{B}|$ in Bnormal, there is also an option to normalize the object function values to its initial value.

When `IsNormWeight = 1`, all the nonzero weights will be divided by the current object function values. For example, in the beginning, the Bnormal error is $f_{B_0} = 0.1$ and input $w_B = 1.0$. Then the updated $w'_B = w_B/f_{B_0} = 10.0$, such that at every step

$$w'_B f_B = w_B \frac{f_B}{f_{B_0}} . \tag{2}$$

** Please note that when writing the output file, the original weights (as same as input) and* **IsNormWeight=1** *are stored. So when you restart, the updated weights could be different.*

solvers.h last modified on 019-03-31 17:03:17.; Focus subroutines;